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AUXILIARY STORE ACCESS CONTROL FOR A DATA PROCESSING SYSTEM

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21 Claims

ABSTRACT OF THE DISCLOSURE

A data processing system wherein apparatus controls the transfer of information between a working store and auxiliary store space provided and utilized for storing a predetermined quantity of information and wherein the apparatus further provides for storing information in normally unutilized space thereby increasing the auxiliary store capacity and provides for separate access to each space for implementing the transfer of the information as required by the system.

BACKGROUND OF THE INVENTION

This invention relates to data processing systems and more particularly to apparatus for controlling access to information in a circulating auxiliary store and the transfer of information between the working and auxiliary stores of a data processing system.

One form of data processing system comprises at least one computer, at least one small capacity quick access working store, a relatively large capacity circulating auxiliary store and a plurality of peripheral control units each coupled to at least one peripheral device. In such a data processing system a series of programs are executed by the computer under control of an operating system which is a collection of programs that are executive or supervisory in nature and provide overall coordination and control of the total data processing system. This series of programs also includes subject programs which are application oriented programs to perform various data processing jobs providing results required by users. Test and diagnostic programs are also included to perform various operational tests for exercising various system components to determine the cause of equipment malfunctions.

In data processing systems required to execute a large number of programs, the quick-access working store capacity is too costly to be large enough to contain all of the operating system programs, subject programs, data to be processed, data which is the result of processing, and test and diagnostic programs. Consequently, only the programs and data most frequently used or currently in process are normally located in working store and the remaining programs and data are located in the relatively large capacity slow access circulating auxiliary store. Since the auxiliary store contains a major portion of sys-

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tem programs and data, it is essential that the programs and data not currently in process remain without unintentional alteration during the operation of any of the separate programs which require access to auxiliary store locations. As the number of programs and data increases, the capacity limit of the auxiliary store is also exceeded and it becomes necessary to provide additional auxiliary store space. The available auxiliary store space must therefore be utilized efficiently to provide maximum storage capacity and access to the space controlled in a manner which will prevent unintentional alteration or destruction of information stored in the space.

Generally control of information movement between working and auxiliary stores in the system described comprises expeditiously transferring data to be processed, data which is the result of processing, and the programs or parts of programs providing the required data processing functions between the working and auxiliary stores and controlling each of the working and auxiliary stores to provide efficient storage and retrieval of the information being transferred. Such control may be effected by one of the peripheral control units. Auxiliary stores normally function as one of a plurality of peripheral devices being controlled by a peripheral control unit.

One form of auxiliary storage device suitable for use may be, for example, the sequential access magnetic disc storage file. This type of storage device is adapted to circulate continuously and be scanned by suitable data transfer apparatus associated with selected circumferential information storage tracks on a surface of a disc. One way of effecting a storage and retrieval operation in such a storage device is to have the surface covered with a suitable magnetic recording material and with which an electromagnetic read/write head, is adapted to record and read back electromagnetic indicia along a particular track adjacent the head. In such an auxiliary store when a new information is recorded along a particular track the electromagnetic indicia previously recorded along a particular track is replaced by the new information, therefore the previously recorded information is destroyed. Information is stored in locations spaced along the length of the track which are termed "sectors." Accordingly, each location is accessed in accordance with a designation specifying the corresponding sector. Between the end of each sector and the beginning of the next sector is an unutilized store space which is termed a "guard band." Guard bands are therefore located between adjacent sectors along the track. It is within a time interval during which this guard band between adjacent sectors is accessible by a head, that the control unit controlling the auxiliary store provides for specifying an operation such as a retrieval or storage operation which is to be performed by the auxiliary store at a next specified location. The guard band provides a time interval during which the read/write head recovers from one storage operation before performing a next different type of storage operation and during which the associated locating apparatus may switch the read/write heads of the tracks for accessing locations in a different track. In such an auxiliary store the length of the guard band space is determined by the switching time of the locating apparatus, the recovery time of the read/write heads and rate of rotation of disc.

All data processing operations are performed on oper-